

Stokes flow of Reynolds number approaching 0 was used in the model to compare with the  $Re=0.01$  flow. Qualitatively the model described the results of the experiment, specifically that the movement of one "lobe of fluid" from one lobe right to left and one from left to right through the SHM grooves. However, the models Stokes flow relegates it to non-inertial flows where flow inertia can't compete with momentum diffusion.

[0020] Sato et al published in November 2004 a study with slanted single angle feature on 3 walls. The authors describe a tight spiral flow that is created. The ratio of groove depth to channel gap is 0.3. The authors state better results when the features on the two side walls are shifted, where 5 slant grooves in a row are present on one side wall then stop while 5 slant grooves in a row start on the opposing side wall and stop and so on. The Reynolds number is less than 10 for this work.

[0021] Howell et al in April 2005 published a study with grooves placed on the top and bottom of the microchannel. The grooves consisted of a set of 4 slanted single angle grooves followed by four chevron grooves then followed again by 4 single angle grooves and so on. The ratio of groove depth to channel gap ranged from 0.24 to 0.74. the

Reynolds number studied ranged from 0.06 to 10. The flow primarily stretched and folded in the main flow path to create more closely spaced lamellae for diffusive mixing. The authors state that they find no significant change in the flow pattern is observed over the range of Reynolds numbers investigated.

[0022] Yang, Huang, and Lin published in August 2005 a study of geometric effects on fluid mixing in grooved micromixers. Again, the fluid was stated as folding and stretching to reduce the diffusion length for mixing. The ratio of groove depth to channel gap ranged from 0.15 to 0.44. The Reynolds number was 10. The authors state no significant correlation between pressure loss and mixing index. The authors evaluated the SHM with sets of 6 like features in a row before alternating the location of the apex of the next set of 6 like features along the width of the main channel. The ratio of flow in the grooves to the main channel is considered to be an important metric for mixing. The maximum flowrate in the groove relative to the flowrate in the main channel is 8.9%.

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